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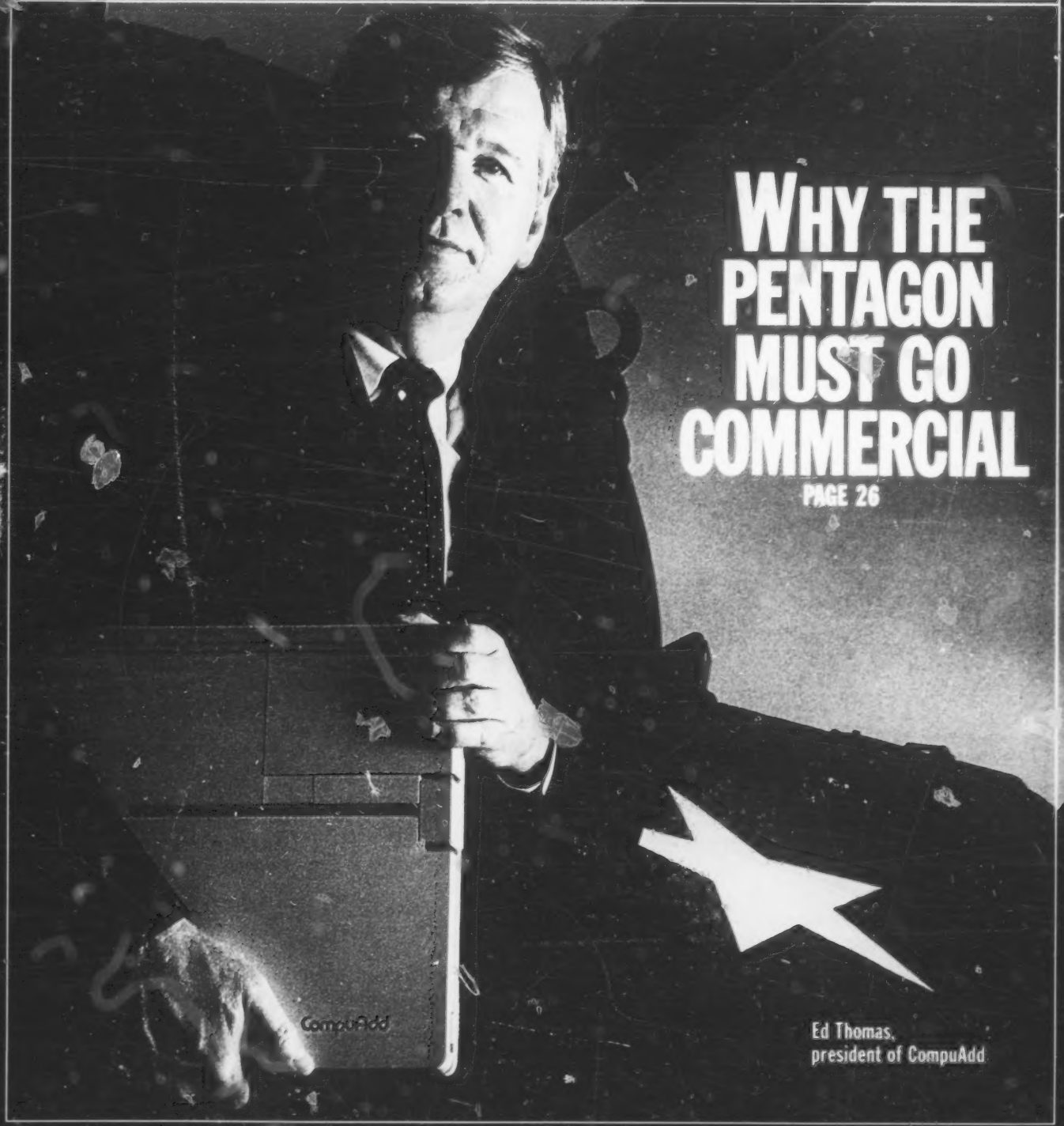
Electronic Business®

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES—WORLDWIDE

JUNE 3, 1991



WHY THE PENTAGON MUST GO COMMERCIAL

PAGE 26

Ed Thomas, president of CompuAdd

Electronic Business

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES WORLDWIDE

VOLUME 17, NUMBER 11 JUNE 3, 1991

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PAGE 26 CompuAdd president Ed Thomas: "I believe the military realizes that commercial-grade product can be way above acceptable"

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The Persian Gulf war may have been a turning point for the U.S. military and for the U.S. electronics industry. The reason: a shrinking defense budget that will increasingly force the military to look to off-the-shelf electronics—which proved more than satisfactory during the Gulf conflict—rather than the pricier mil-spec versions. Now the industry wonders whether the Pentagon can change its traditional way of doing business

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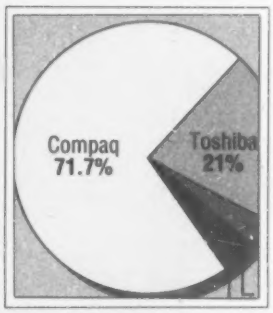

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(303) 388-4511

Total Circulation: 77,904

REPRINTS

ELECTRONIC BUSINESS articles are available on a custom printing basis at reasonable prices. Contact Andrea Marwitz, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., P.O. Box 5080, Des Plaines, IL 60018 (708) 635-8800
Electronic Business can be purchased on 35mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, MI 48106

Quality-conscious suppliers may reap "defense dividend"

WHEN THREE important trends synchronize, look for a major shift in the marketplace. That's what is happening as total quality management, shrinking defense spending, and changing military strategies all meet in the U.S. electronics market.

Art director Michael Roach: a new look for a new era

Throughout the course of the Gulf war, ELECTRONIC BUSINESS has chronicled the success of computer-based weapon systems. It has also forecast the growing importance of electronically driven surveillance, communications, and intelligence systems in the post-Cold War era.

And it's no secret that Pentagon budgets face continued pressure. Only seven months ago, the Electronic Industries Association predicted that the defense budget will shrink by nearly one-third by the end of the century, and that annual expenditures for defense electronics will plummet from more than $55 billion last year to $38 billion by the year 2000. One major military victory later, defense analysts still look for double-digit budget cuts over the next five years, with resulting pressure on the Pentagon to streamline its procurement bureaucracy.

Total quality management is a theme we've been hammering on for years, and apparently OEMs have gotten the message. Forced to turn to commercial suppliers to feed its intense need for computers and other electronics systems in the Gulf, the Pentagon found out that these products measured up admirably to the much-vaunted "mil-spec" requirements for toughness and reliability. As associate editor Peter Burrows reports, it's no accident that a commercially supplied personal computer survived a Scud missile explosion that hurled it 50 feet through the air. With that kind of anecdotal evidence, Peter reports, it's getting easier to promote the use of commercial technology by the military.

As you can see by paging through this issue, today's new look goes far beyond defense spending. Thanks to art director Mike Roach, the design of ELECTRONIC BUSINESS itself has been overhauled to reflect the changing tastes and demands of our readers. Throughout the magazine, you'll notice that we're now a little more reader-friendly—the copy is a bit less dense, the artwork brighter and easier to understand.

But if it doesn't work for you, then it doesn't work for us either. Drop us a line and tell us what you think.

—John Parker, contributing editor

ELECTRONIC BUSINESS® (ISSN 0163-6197, GST Reg. #123397457) is published twice a month, except monthly in December, by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington Street, Newton, MA 02158-1630. Terrence M. McDermott, President; Frank Sibley, Executive Vice President; Jerry D. Neth, Senior Vice President/Publishing Operations; J.J. Walsh, Senior Vice President/Finance; Thomas J. Dellamaria, Senior Vice President/Production and Manufacturing; Ralph Knupp, Vice President/Human Resources. ELECTRONIC BUSINESS® is a registered trademark of Reed Properties Inc., used under license. Circulation records are maintained at Cahners Publishing Company, 44 Cook Street, Denver, CO 80206-5800. Telephone: (303)388-4511. Second-class postage paid at Denver, CO 80206-5800 and additional mailing offices. **POSTMASTER: Send address corrections to ELECTRONIC BUSINESS, PO Box 173377, Denver, CO 80217-3377.**
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Annual subscription rates for non-qualified people: USA, $84.95; Mexico, $124.95; Canada, $133.70; other countries, $149.95 per year; $140, air mail surcharge. Subscriptions include all issues. Except for special issues where price changes are indicated, single copies are available for $15.00 (USA, Canada/Mexico and foreign). Please address all subscription mail to Eric Schmierer, 44 Cook Street, Denver, CO 80206-5800. Cahners Publishing Company, A Division of Reed Publishing USA • Specialized Business Magazines for Building & Construction • Research • Technology • Electronics • Computing • Printing • Publishing • Health Care • Foodservice • Packaging • Environmental Engineering • Manufacturing • Entertainment • Home Furnishings • Interior Design. Specialized Consumer Magazines for Child Care • Boating • Wedding Planning.

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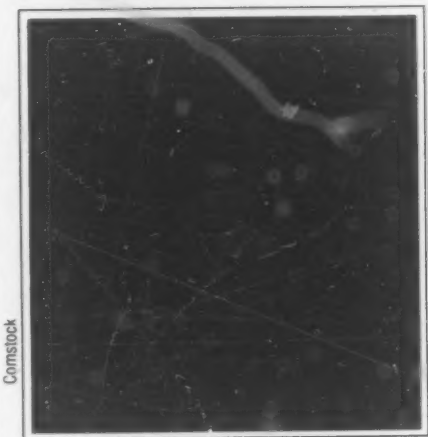
TRADE

Industry backs free trade pact

WHEN PRESIDENT Bush recently alluded to the creation of "the largest, richest trade zone on earth," he wasn't thinking about the single European market of 1992. Rather, he was referring to the proposed North American free trade agreement (FTA), which would merge Mexico, the United States, and Canada into a single market much larger than the European Community.



Comstock

The administration clearly hopes to make FTA a reality, and U.S. electronics companies have been vocal in their support. For the $280 billion U.S. electronics industry, the impact of adding Mexico to the 1988 Canadian-U.S. trade alliance will be minor; the size of the U.S industry makes Mexico's electronics contribution—$6.5 billion, or 2% of the U.S. industry—seem like a drop in the bucket.

For individual U.S. interest groups, however, FTA's impact will be far from minor. Clearly among the winners will be U.S. electronics companies with deep pockets to invest in an emerging country. U.S. companies have already taken advantage of proximity, low wage rates, and special tax incentives to build *maquiladoras*, production plants on Mexico's border. A free trade agreement would make Mexico even safer for direct foreign investment. General Motors (whose electronic divisions include Packard Electric, GM Hughes Electronics, and Delco Electronics), AT&T, Zenith Electronics, United Technologies, and Eastman Kodak have all announced their support for FTA.

The most heated opposition to FTA comes from U.S. labor unions. The reason: Unskilled laborers, who are paid an average of $14.32 an hour in the United States, will lose jobs to *maquiladora* laborers who get just $1.63 an hour. Exactly how many jobs will migrate south of the border under FTA remains the subject of debate among consultants. KPMG Peat Marwick's study done for the U.S. Council of the Mexico-U.S. Business Committee estimates that less than 1% of U.S. electronics workers will lose their jobs to Mexican laborers.

U.S. labor may fare better than it supposes, if moving jobs to Mexico simply replaces moving jobs to low-wage Asian countries. In effect, every plant that moves to Mexico rather than Asia is that much closer to U.S. supply lines, which saves jobs at supplier plants. But while this argument may appeal to U.S. business owners, labor unions aren't buying it. For labor, the mission is to stem the flood of well-paying factory jobs that are leaving the United States and to fervently oppose FTA.

The administration's push for a North American trade agreement with Mexico comes on the heels of several years of astounding export success. According to the Electronic Industries Association, the United States exported $5 billion of electronics products to Mexico in 1990, up 32% from 1988. Most experts agree that since a free trade pact will help the Mexican economy grow, electronics exports will grow even faster under the agreement. As a developing country, Mexico's appetite for high-tech products (particularly telecommunications equipment) will be voracious. Under a North American FTA, the United States and Canada will have the inside track to provide these goods.

The odds seem to be in favor of the North American free trade agreement. So, while Fortress Europe is being erected for 1992, it seems that Fortress North America is preparing to retaliate.

—Elizabeth B. Baatz

Jobs and free trade

Change in domestic employment

	Computers	Components	Instruments
U.S.			
employment	-2,700	-4,700	11,400
% change	-0.7%	-0.8%	0.9%
Mexico			
employment	2,400	15,100	7,000
% change	9.1%	16.2%	9.4%

Note: Data represents employment change in 1988 if there had been a free trade agreement in effect.

Source: KPMG Peat Marwick, Feb. 1991

IC PRODUCTION

Submicron capacity on the rise

THE U.S. SEMICONDUCTOR industry continues to push into the submicron realm. The latest ground was broken by Motorola Inc.'s new fab in Austin, which features 0.35-micron geometry. Located near the stomping grounds of Sematech, the new half-billion-dollar fab is stocked with the latest equipment, more than 80% of which came from American suppliers. Only 2%

of the construction fees went to non-American companies.

Motorola's Semiconductor Products Sector brought in $3.4 billion in sales in 1990 and is ranked by market researcher Dataquest Inc. as the world's fourth-largest semiconductor maker. The plant, called MOS 11, represents Motorola's largest investment ever. The fab is the first commercial 8-inch wafer fab in the United States and combines CMOS and BiCMOS capability.

Other companies are also planning for low submicron geometry. AT&T Microelectronics and NEC Corp., which topped Dataquest's worldwide semiconductor company ranking in 1990, recently announced plans to collaborate on a 0.35-micron CMOS process. That process will be ready for manufacturing by 1995.

—Teri Sprackland

PORTABLE COMPUTING

Powerful computing comes to the palm

EVEN AS ANALYSTS predict a price bloodbath in notebook computers, Hewlett-Packard Co. has debuted the HP 95LX, the company's checkbook-size palmtop offering. The introduction, however, comes amidst limited success by other vendors—notably Atari Corp. and Poqet Inc.—in bringing palmtops to the masses. Atari and Poqet, in fact, have recently slashed prices on their palmtops by 25%.

The 95LX, probably the worst-kept secret in computerdom, was jointly unveiled in late April by HP CEO John Young and Lotus Development Corp. CEO Jim Manzi. While the tiny XT-compatible gets high marks for its big memory offerings, analysts say it's still too early to gauge the 95LX's impact on the poorly defined palmtop market.

"It's actually more personal than a PC," observes Computer Intelligence analyst Dan Ness, noting that the 95LX incorporates the handiness

Lotus's CEO Jim Manzi: unveils one of the worst-kept secrets in computers

of personal organizers (such as Sharp's Wizard and Casio's BOSS) with Release 2.2 of Lotus's 1-2-3 spreadsheet, Microsoft's MS-DOS 3.22, and 1 megabyte of ROM. "Its spreadsheet orientation will have broad appeal," predicts Ness. "But it is *not* a PC replacement."

But what some analysts find most significant is HP's strategy in designing the 95LX: a computer, calculator, memo editor, scheduler, communications program, and file manager for $699. Organizers such as Sharp's peak at around $300, and the low end of the laptop/notebook market is near $1,000. The LX's strength in calculating is not coincidental; perhaps seeing the writing on the wall, HP chose its Corvalis, Ore., calculator division to build it. "It's going to open some doors for palmtops that weren't even there before," Ness predicts.

Although the 95LX is limited by its tiny keyboard, Ness believes it will appeal to numbers-oriented users. "HP usually goes for the more demanding, scientific [user]," he says. "It's the kind of reputation and relationship that HP has maintained throughout all its products."

Another feature that hasn't received much attention is the infrared communications capability, which makes transferring data from one 95LX to another as easy as using a TV remote. One 95LX can communicate with another via a built-in infrared link, or with the rest of the world with a serial port and cable.

Finally, HP has adhered to standards (such as its JEIDA RAM card) that will ensure interoperability and long life for the 95LX. "This will become more important over the years," says Ness. "People will be able to carry around a significant amount of information."

HP sees an obvious market among students and financial, sales, and real estate professionals. That doesn't include 1-2-3 users who'd love to have one for the road.

—Steve Smith & Barbara Jorgensen

FDDI SOLUTIONS

Motorola joins FDDI fray with new chip set

THE PROSPECTS FOR lower-cost FDDI connections brightened recently as Motorola Inc. introduced a chip set for implementing the 100-megabit-per-second network—the third IC solution to reach the market.

Even though Advanced Micro Devices Inc. of Sunnyvale, Calif., and National Semiconductor Corp. of Santa Clara, Calif., already sell chip sets for the Fiber Distributed Data Interface, analysts believe Motorola's product will catalyze faster price reductions for the chips and the products that incorporate them. Most believe, however, that it will take some time for prices to drop. "I don't think this will be the year of dramatic price cuts," says Marty Palka, Dataquest Inc.'s senior industry analyst for networks. In the near term, he says, manufacturers of FDDI products will focus on improving the performance of the connections, which will keep prices fairly high.

Cards to link PCs to FDDI net-

works now cost about $4,000 to $5,000, while cards for more sophisticated computers and workstations often run more than $10,000.

By next year, though, FDDI interconnection costs could begin to tumble. Connection costs for PCs should reach the $1,000-to-$1,500 range by 1993, Palka predicts, which will be inexpensive enough to bring the fiber network to many corporate desktops.

Pricing aside, Motorola claims its FDDI chip set, produced by the company's Microprocessor Products Group in Austin, offers better performance than its AMD and National Semiconductor counterparts, in part by containing two 32-bit ports for streamlining data transfers. The chip set was developed in association with Digital Equipment Corp. of Maynard, Mass., which is also one of Motorola's first customers.

—Dwight B. Davis

DAT DRIVES

Crowds are thinning in DAT market

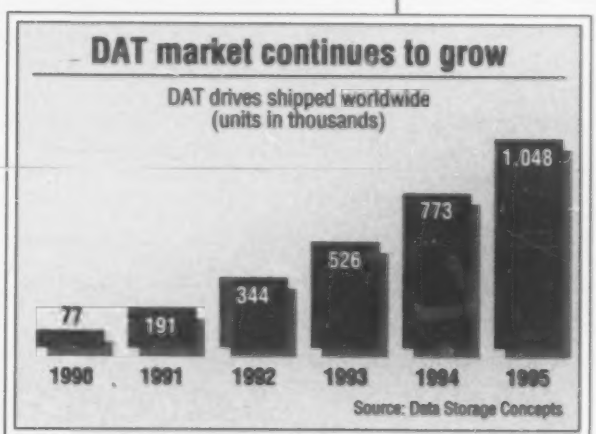
NOT TOO LONG ago, observers predicted that some 30-odd producers would by now have emerged in the digital audio tape (DAT) drive market. So far, the actual number has hit only six. That suggests that the field may not become as crowded or unprofitable as once feared.

To date, the only OEM drive manufacturers shipping products in volume are Archive Corp., Hewlett-Packard Co., WangDAT Inc., Wangtek Inc., GigaTape GmbH, Alps Electric Co., and Sony Corp.; Japan's JVC Information Products division and two American companies (R-Byte Inc. and Alliance Technology Inc.) are expected to be shipping in volume by mid-year. Other early contenders—mostly Japanese vendors that presumed to leverage and capitalize on volume sales of consumer audio tape decks—have either fallen by the wayside or are still struggling to get evaluation units of computer data-grade drives out the door.

In the meantime, the lucrative OEM system design-in window is open. But it won't stay that way for long. OEM systems vendors such as Sun Microsystems Inc., Compaq Computer Corp., and Data General Corp. are all evaluating the latest 3.5-inch form factor DAT drives, and vendors who offer both evaluation units and production capacity will corral the business. "You can expect that a dozen will survive," according to Data Storage Concepts president Lee Elizer. "There certainly won't be 30."

There is still room for latecomers such as R-Byte, a San Jose-based 1989 start-up that has some impressive venture backing and is touting a made-in-the-U.S.A. image. "It's an important point for [system OEMs]," says R-Byte vice president of sales and marketing Gerald Boudreau. "American companies tend to buy American, and the rest of the field is either Japanese or relies on Japanese technology for its products."

—Dave Webb



TECHNOLOGY

Moving on-line to move computers

PERHAPS IT SHOULD have happened a long time ago, but computer resellers are finally using the technology they market to run their businesses more efficiently.

Major computer distributors and retail chains are taking their reseller customers on-line with new and sophisticated database software that provides the latest prices and technical specifications for each system. The data is updated weekly or even daily via modem. The software can track a reseller's discount history with a particular customer, print out sales proposals in minutes, and even price a complex array of equipment on the basis of a specific profit margin.

Use of this kind of leading-edge sales tool is growing, says analyst Susan Yamada at Merrin Information Systems. "Of course, they have to carefully select the customers who buy the system because it's expensive," she says. "But there's a definite competitive advantage to these kinds of products. It's cheaper to place orders, they cut down on errors, and they tie the reseller tightly to the distributor."

Ingram Micro Inc., for one, has sold its System Quote database to 271 customers in the first three months of this year, with a target of 350 installations for the year. Installation of System Quote runs at around $1,995.

And many think this is the way business eventually will be done. "I've got to believe most of the business, five years out, will be electronically driven," says Merisel Inc.'s national accounts vice president, Judy Rosethshe. Merisel's Dialup Salesnet and Remote Salesnet let resellers access price and product data from the Merisel mainframe, but don't yet feature quotation or margin calculation.

Computer chains are getting into the act as well. Valcom Inc. is beta-

testing an on-line system that can be updated nightly, and MicroAge computer store owners such as Tony Rametra can even crossload the latest MicroAge prices from the chain's ZData system to the System Quote database.

Such compatibility is part of Ingram Micro's overall strategy, says Barry Torman, president of Information Science Associates in Chicago and the creator of System Quote. System Quote users can access information on other distributors' product lines as well. Torman says Ingram Micro wanted to avoid the chaos that befell early airline reservation software, which was proprietary and limited to one carrier's flights.

—John Parker

STANDARDS

OSF makes gains on Sun's standards

INDUSTRY PUNDITS predict that the Open Software Foundation's Distributed Computing Environment will win out over competing technology from Sun Microsystems Inc. and Unix International. Widespread acceptance of DCE would be another blow to Sun's efforts to set industry standards.

Forrester Research Inc. in Cambridge, Mass., expects DCE (a set of specifications for sharing applications across computer networks) to overtake by the mid-1990s the Open Network Computing technology backed by Sun and UI. Specifically, unit shipments of the DCE remote procedure call technology will surpass the Sun/UI technology in 1995. A year later, shipments of the DCE distributed file system will exceed those of Sun's Network File System, a critical component of ONC.

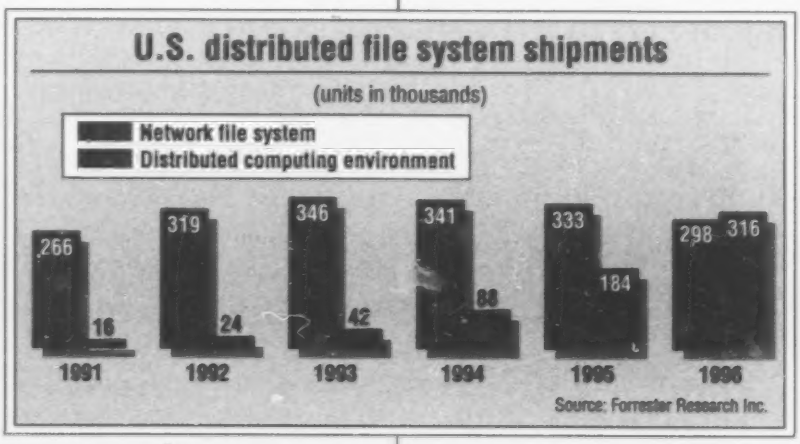
"Politically, Sun has been pretty inept setting standards in the last three years," says Forrester analyst John C. McCarthy, who believes Sun has focused so much effort on making its Sparc RISC architecture a microprocessor standard that software such as ONC and the Network Windowing System has languished.

DCE received a major boost in April, when Compaq Computer Corp. and other founders of the ACE (Advanced Computing Environment) consortium endorsed DCE as part of the group's proposed specifications for an industry-standard workstation platform.

"Any doubts regarding whether DCE will emerge as the dominant multivendor computing environment should be laid to rest," wrote UBS Securities Inc. analyst Marc Schulman in a recent report.

As proof of DCE's expected success, observers cite the number of industry heavyweights backing the proposed standard. Supporters include Compaq, Digital Equipment Corp., Microsoft Inc., IBM, and Hewlett-Packard Co. ACE is widely seen as a move to slow Sun's growth in the workstation arena, while OSF was intended to blunt Sun's ability to establish industry standards.

—Rick Whiting



QUALITY

106 companies apply for Baldrige

THE NATIONAL INSTITUTE of Standards and Technology has announced that 106 U.S. companies have applied for the 1991 Malcolm Baldrige National Quality Award, the largest number since the award was created in 1987, including 38 manufacturers, 21 service companies, and 47 small businesses.

Last year, only 4 of the 97 applicants received the award: IBM's Rochester (Minn.) unit and GM's Cadillac Motor Car Division in manufacturing, Federal Express Corp. in service, and Houston-based Wallace Co. in the small-business category.

If the past is an indication, only a handful of applicants are likely to pass the initial screening and receive site visits. In the manufacturing category (which encompasses most electronics companies), the number of site visits has steadily declined, from 10 in 1988 to 6 last year.

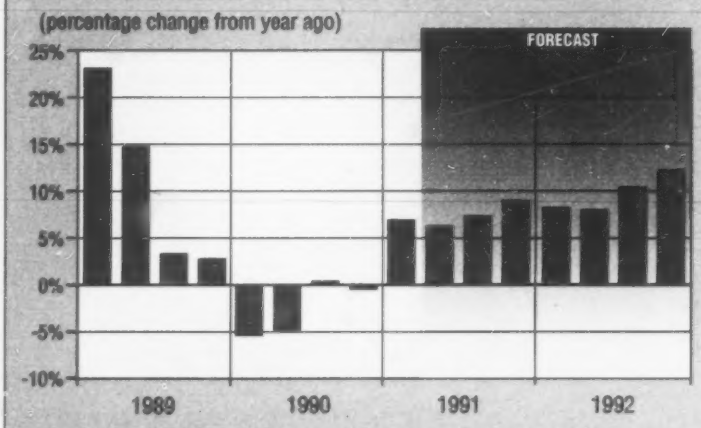
The Baldrige criteria have changed steadily since the inception of the award. Among the changes from last year's guidelines:

- Greater weight will be placed on customer relationship management;
- The educational value of the exam and scoring system will encourage training and self-assessment;
- Applicants will be required to be more specific about methods, processes, and results.

Named for the late Commerce Secretary, the Baldrige Award is intended to promote national awareness of the importance of quality. This year's winners will be announced in the fall.

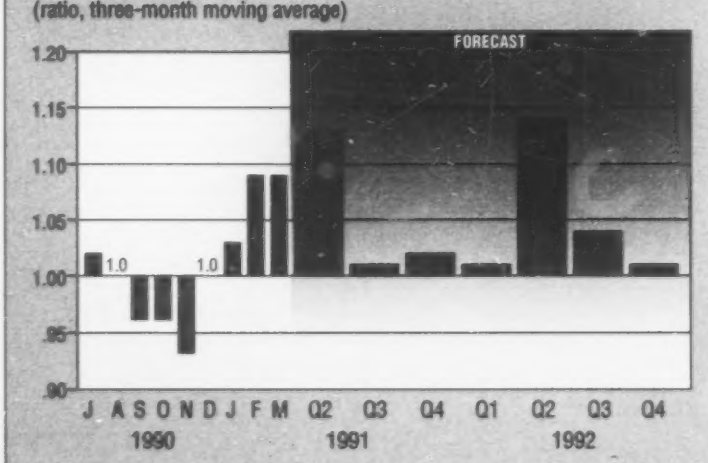
—Barbara Jorgensen

Semiconductor sales swell in the first quarter...



...while orders rebound at the same time...

...keeping the book-to-bill ratio above 1.00



Source: Semiconductor Industry Association; forecast: Cahners Economics

Surprise! Semiconductor orders up in early 1991

YES, SEMICONDUCTOR sales to the North American market did indeed suffer last year. Compared with year-ago levels, sales declined in every quarter last year except the third. Sales in that period squeaked out a meager 0.5% gain.

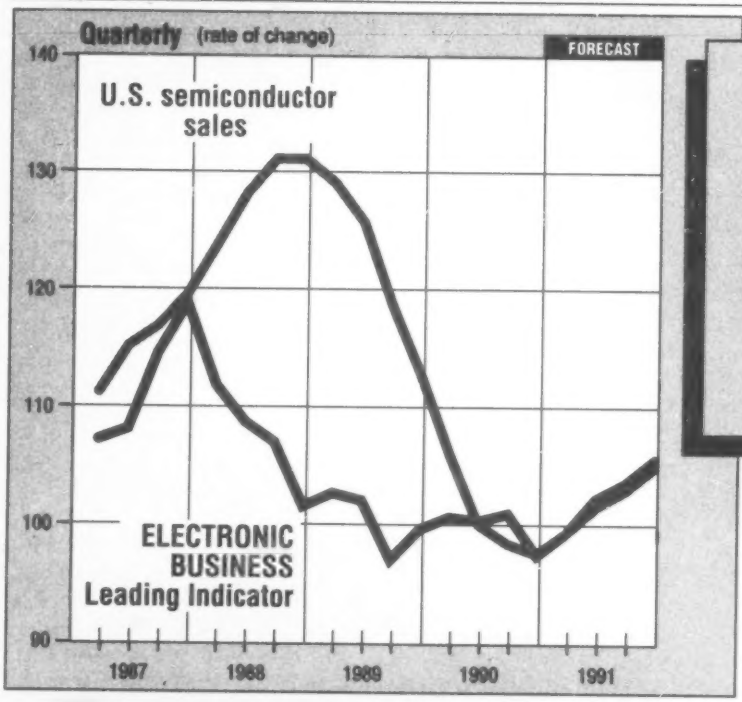
But the surprising news from the Semiconductor Industry Association may mean the semiconductor slump is over. Semiconductor sales to the North American market finally rebounded in the first quarter of this year, jumping 7% above year-ago levels to $3.74 billion. The last time the industry had a quarterly gain of this magnitude was in the second quarter of 1989. Because Cahners Economics had been expecting semiconductor sales to rise only 3% in the first quarter, we have raised our forecasts slightly for this year, which has stolen some growth from 1992. Semiconductor sales are now forecast to climb 7.5% to $15.5 billion this year and push up 9.9% next year.

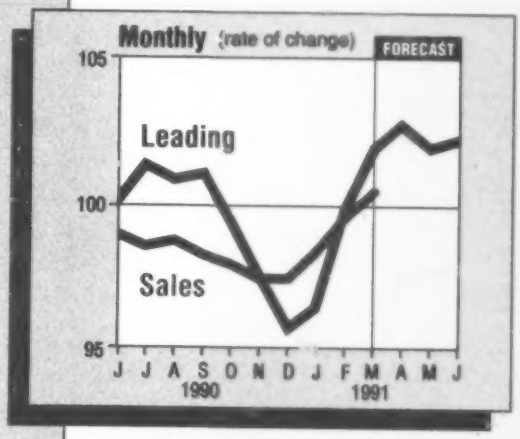
The fact that the Gulf war crisis led the semiconductor industry into the abyss of recession shows up clearly in growth of semiconductor orders. After expanding 10% in August 1990 from the year-ago period, monthly growth in orders shriveled through the beginning of this year. But with the end of the war came some renewed demand. New orders rose 1.5% to $3.82 billion in the first quarter of this year. Cahners Economics' outlook calls for continued strong orders growth, beginning in the second quarter.

—Julie Handelman

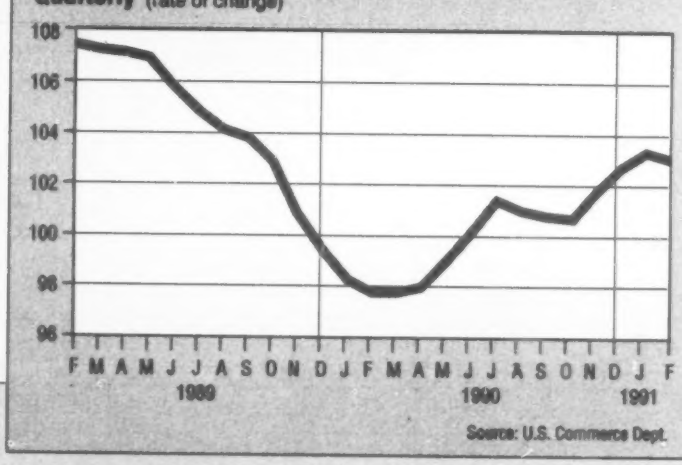
For more information on Cahners Economics' forecasting services, including seminars, newsletters, and database diskettes, contact Dan Buchan at (617) 630-2105, by fax at (617) 630-2100, or write Cahners Economics, 275 Washington St., Newton, MA 02158

ELECTRONIC BUSINESS Leading Indicator rises sharply in March





Components inventory growth is revised upward



Source: U.S. Commerce Dept.

Leading indicator rises sharply in March

AN UPTURN IN THE electronics industry is just around the corner, according to the ELECTRONIC BUSINESS Leading Indicator (EBLI), which jumped 2.1 percentage points to 101.9 in March.

The Commerce Department recently revised the historical data for the components industry, causing minor changes to the historical data of the EBLI. Cahners Economics' forecast now calls for a high of 107 in March 1992, rather than 106.6 in January 1992.

To obtain your complimentary background paper, contact Cahners Economics, 275 Washington St., Newton, MA 02158-1630, USA; telephone (617) 630-2119; fax (617) 630-2100.

	Latest month	Previous month	Year ago	1990 average
ELECTRONIC BUSINESS Leading Indicator (rate of change, Mar.)	101.9	99.8	99.5	99.9
U.S. semiconductor bookings ($ millions, 3-month average, Mar.)	$1,363	$1,272	$1,333	$1,254
Weekly hours of semiconductor production workers (monthly average, Feb.)	41.0	39.7	40.6	40.4
Electronic components lead time index (1977 = 100, Apr.)	91.5	78.0	82.9	80.7
S&P's semiconductor stock price index (1970 =10, monthly average, Mar.)	70.6	70.3	67.0	64.6
Change in electronic components inventories ($ millions, SA, Feb.)	-$212	$5	-$5	$33
Contracts and orders for plant and equipment ($ billions, SA, Feb.)	$41.0	$41.9	$41.1	$42.3

SA = seasonally adjusted; all other data are not seasonally adjusted

Sources: Semiconductor Industry Association, U.S. Bureau of Labor Statistics, *Electronics Purchasing*, Standard & Poor's, Commerce Dept.

CFOs report rebound in capital spending

After a brief respite, more electronics companies are gearing up to invest in capital equipment again. At least this is the view from the latest ELECTRONIC BUSINESS capital spending poll of 62 chief financial officers surveyed last February about their investment plans. Almost half said they intend to increase their capital spending this year.

These results signal a turnaround from the downward trend that had dominated earlier surveys. When asked about their spending plans for the first quarter of 1991, 44% said they would be increasing capital spending from year-ago levels, and 38% said spending would be up from the previous quarter. During the previous two quarterly surveys, the percentage of chief financial officers who planned to increase capital purchases in the upcoming quarter had steadily declined to 32% and 21%, respectively. The fact that more CFOs plan to increase short-term spending is encouraging since most responded to the survey prior to the end of the Gulf war.

As expected, the biggest constraint on capital budgets was the recession. Almost half of those surveyed said that the recession, or an expectation of weak sales growth, has held capital spending down so far. □

Capital spending plans improve
(percentage of responents)

Compared with a year ago, capital spending has or will...

	...increase	...decrease	...stay same
1990	41%	41%	18%
1991	49%	31%	20%

Source: ELECTRONIC BUSINESS

equipment shipments will grow 9%, when low inflation, a general economic recovery, and strong capital spending will benefit electronics.

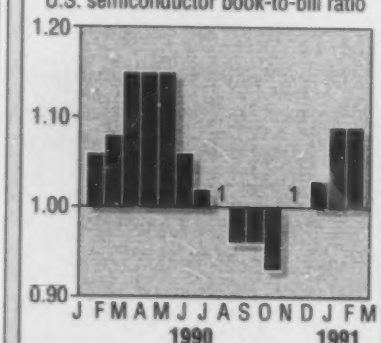
As for semiconductor sales, Jack Beedle, president of In-Stat Inc. in Scottsdale, Ariz., predicts U.S. semiconductor sales will rise around 5% this year after a 2.6% decline last year. Beedle believes the semiconductor bookings boom, which occurred in the first quarter of 1991, will have disappeared in the second quarter, just like the aborted recovery in early 1982. Why? Beedle is simply a bit more pessimistic about near-term prospects for the industry than his forecasting colleagues. Dataquest, Cahners Economics, Henderson Ventures, and TI's Catto all expect semiconductor sales growth to be a bit stronger—in the 7% to 10% range.

For 1992 Henderson and Beedle expect semiconductor sales to rise at least 20%, while Dataquest and Cahners Economics foresee growth of only 10% to 13%. The disagreement lies in uncertainty about price projections. Dataquest, for example, maintains price increases will be constrained by excess fab capacity and the lack of a major demand-pull breakthrough chip or computer system. Forecasters often disagree. What is more surprising and significant is any measure of agreement, however mixed. The consensus now is that the emerging recovery will be weak in the latter half of 1991 and somewhat stronger in 1992. As ELECTRONIC BUSINESS rounds up the figures, look for electronic equipment shipments to grow around 5% in 1990 and perhaps double that rate at 10% in 1991. □

The electronics industry:

Semi book-to-bill is up also...

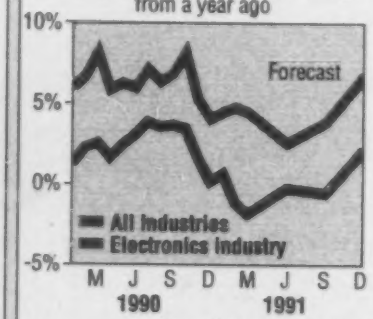
U.S. semiconductor book-to-bill ratio



Source: Semiconductor Industry Association

...which all bodes well for electronics

Industrial output, percentage change from a year ago



Source: Federal Reserve Board; Forecast: Cahners Economics

Notebook computers grow up in a hurry

Supply problems have faded, the manufacturer lineup has grown, and prices will fall even further

By John Parker

What weighs 4 to 7 pounds, measures 8.5 inches by 11 inches by 3 inches, and breaks all the rules of high-tech pricing and production? Answer: the next $5 billion computer market.

That's the value some analysts put on the market for notebook computers by 1995. Reaching that lofty figure will mean new strategic partnerships and a down-and-dirty price war that experts claim already has turned new technology into a commodity business.

Until this year, the notebook computer business had been hampered by chronic supply problems resulting in tepid sales growth. In the U.S. retail channel, unit sales of notebook computers went from 37,000 in the first quarter of 1990 to only 39,000 in the fourth quarter, according to Storeboard Inc. in Dallas, a specialist in tracking sales of computer products. Retail sales figures actually declined in midyear, dropping from 42,000 units in the second quarter to 40,500 in the third.

"We heard a lot about how notebook portables would be a growth area in 1990," explains Storeboard's JoAnn Stahel. "Spring Comdex 1990 was a blitz on all portables, and everybody was pointing to notebook introductions and saying, 'Look what we can do down the line.' But then there was no delivery."

That has been frustrating to retailers such as The Laptop Shop in Manhattan, where sales manager Bill Gray was still waiting in early April for a shipment of notebook computers announced three months earlier by AST Research. But Gray says supply problems in general are starting to fade, and sales of the retailer's six lines of notebook computers now account for 60% to 70% of its business, versus 30% six months ago. With increasing variety and demand come falling prices. The average notebook price dropped from $3,000 in September to $2,000 in March, says Gray.

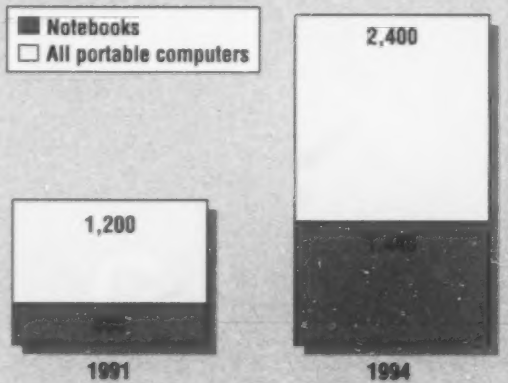
The story is similar at the San Jose headquarters of PC channel leader Businessland Inc. "NEC was teasing the market with its UltraLite. They were amazed at the response," says Randy Crocker, who is product-line director for laptop and notebook computers. "Now those units are going for $689."

PRICING IS AS erratic at the high end of the notebook market. Only seven months ago, Houston's Compaq Computer Corp. offered its 386SX LTE model at roughly $6,500. Dell Computer and AST quickly countered with their 386SX versions, selling at around $3,500. Analysts say that process has cut gross margins on notebook computers to an average of 30%, more than five percentage points below the average for other PC product lines. Overall, distributors and manufacturers see average list prices in the notebook computer market declining roughly 10% every six months, compared with 10% per year in the PC market as a whole.

Many observers predict white-hot growth for notebooks for the next few years. Hambrecht & Quist analyst Bill Lupatkin sees 1991 sales topping 1 million units, with the notebook market maintaining 50% annual growth. BIS Strategic Decisions in Norwell, Mass., predicts that growth in sales of notebook computers will dramatically outpace growth of the overall portable computer market over the next five years. BIS has notebook

Smaller portables play a bigger role

(units sold in thousands)



Source: Creative Strategies Research

computers contributing $800 million (15%) to a 1990 portable computer market of $5.5 billion; by 1995, according to BIS analysts, notebook computer sales alone will have risen to $4.7 billion—roughly 30% of the total portable computer market of $15.7 billion.

Behind the demand for notebook computers, say industry experts, are several major factors: a savvier population of computer buyers, improving manufacturing technology, and a commitment by major companies in desperate need of a growth market.

"You could say notebooks are becoming a commodity market, largely because people are clearer on what they want from the technology," says analyst Tim Bajarin at Creative Strategies Research in Santa Clara, Calif. "About 90% use portables as secondary systems—as extensions of desktop computers—so there's a natural evolution."

Hambrecht & Quist's Lupatkin agrees that buyers of notebook models are probably "a little different" from buyers of desktop PCs. The products will be sold mostly to individuals rather than to corporate purchasers, he explains, which implies more price-sensitivity. Moreover, says Businessland's Crocker, those individual buyers of second computers are attracted by high-end features. A full of them 60% want modems attached, while 25% spring for lightweight printers. Even battery-powered CD-ROM players are now in demand. "Notebooks are fun to sell," he says. "They're a status symbol—sexy and sleek—so there is a lot of pull on the product."

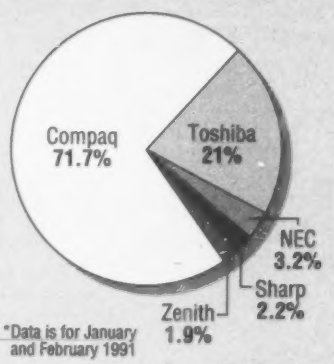
What will differentiate future notebook computers technologically? Advanced VGA displays, flash ROM, and mass storage are areas targeted by many manufacturers. "Unlike the desktop world, there's plenty of room for product differentiation," says Tom Martin at Toshiba Corp. in Irvine, Calif. "Volume buyers need color, and they need communications capabilities. That's why we make five kinds of notebooks."

Businessland's Crocker sees the promise of big corporate orders as well, pointing to the *Fortune* 100 company that recently ordered 500 notebook computers. "What's exciting to them is that you can bring a desktop-computer advantage to the field sales level—actually using it as a sales tool."

ANOTHER REASON for the notebooks' success is the advances in enabling technologies such as liquid crystal displays, miniature memory chips, and nickel-hydride batteries, all of which make it possible to offer high-performance notebooks in quantity. Bringing these technologies to market has meant partnerships between U.S. computer makers and Japanese companies, such as Toshiba and Sony Corp., that dominate the technologies and are leading in manufacturing miniaturization.

Slicing up the notebook retail market

(U.S. market share by manufacturer)*



*Data is for January and February 1991

Source: StoreBoard Inc.

But while notebook computers may be easy to sell, they're hard to make, compared with desktop and even laptop PCs. That's because the small form factor prevents the simple assembly of standard PC components from a variety of sources. "Design is one thing, manufacturing is another," says K. W. Jun, director of marketing at Samsung U.S. in San Jose.

Nevertheless, the presence of industry giants such as these in the emerging notebook market is causing component makers to ramp up production. An example is Conner Peripherals in San Jose, the only U.S. source for 60-megabyte, 2.5-inch disk drives. Conner is the source of disk drives not only for 19% stakeholder Compaq, but also for IBM's first notebook market entry (announced in late March). Samsung also buys its 2.5-inch drives from Conner, but Jun sees drive makers Quantum and Western Digital entering the market later this year.

With a well-established customer demand, several major players have recently emerged to secure their places on the notebook bandwagon. The results have already shown up at the cash register: In January and February of this year alone, says Storeboard's Stahel, computer retailers reported sales of 30,000 notebook units, compared with the 37,000 logged for the first three months of last year. Stahel adds, however, that only a third of today's notebooks sell through computer retailers such as Businessland; the vast majority are sold through direct sales or mass-merchandisers.

Not surprisingly, large companies with experience in the portable computer market have an easier time ramping up production, thanks to their long-standing relationship with component suppliers. Although early supply problems dampened sales of Compaq's popular LTE, the company fully expects to catch up with back orders, according to Richard Swingle, director of strategic marketing. Toshiba's strategy for dealing with the supply issue rests on its size and ability to cultivate a large base of component suppliers for its 14 models of portable computers, says vice president of marketing Tom Martin.

IBM's $5,995 portable was a watershed in notebook-computer history, even though Big Blue straddled the line between laptop and

notebook. The caution is understandable: IBM had to withdraw its PC Convertible in 1989 and delay its laptop introduction for a year as prototypes flopped.

IBM's 386SX notebook weighs in at 7.7 pounds, putting it in the notebook weight class, but it keeps a full keyboard that gives it the form factor of a laptop. "IBM recognizes the significance of this marketplace," according to IBM spokesperson Kevin Clark. "People are just going to want smaller machines." To test the market for IBM computers with a notebook form factor, IBM Japan is releasing a smaller version with a Kanji keyboard for its Japanese customers.

Also running to catch the notebook bandwagon is Cupertino, Calif.-based Apple Computer Inc., which has partnered with a Japanese manufacturer (rumored earlier this year to be Sony). Three notebook-size Macintosh models, priced from $2,500 to $5,000, are expected to hit the market in September. "We missed the laptop market," admitted Apple chairman and CEO John Sculley in a recent speech to the Software Publishers Association. "We're not going to miss the notebook market."

NEITHER WILL anyone else, apparently. The list of manufacturers crowding the notebook market in the past 18 months reads like a condensed history of personal computing. U.S. companies (including Compaq, Texas Instruments, and Zenith Data Systems) are being followed and overshadowed by Japanese component makers and OEMs such as NEC and Toshiba, who are being followed in turn by Korean and Taiwanese OEMs. Korean computer giant Samsung, for example, started shipping its 20-Mbyte-drive notebook computer in February at a list price of $3,999. Last month, Taiwan-based Acer Inc. was preparing to introduce models with 20-Mbyte, 40-Mbyte, and 60-Mbyte drives. Company sources were cagey about the price tags, however, saying only that the notebooks would list at more than $3,000.

While buyers of notebook computers have plenty of brand names to choose from, the needs of the corporate volume buyer may close that end of the market to many OEMs. "To meet the needs of the volume buyer, it's got to be more than a toy," according to Compaq's Swingle. "Business users now understand that a 20-Mbyte drive is marginal; just running Windows and a couple of applications eats up 12 Mbytes to 15 Mbytes. Salespeople need to connect to the office network, even when they are overseas." Just as important, the computers must be sturdy. "If you buy a hundred of these for your company," Swingle continues, "you don't want them to break when you drive around with them in the trunk of your car." □

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MY VIEW

The new paradigm

ACCORDING TO DATAQUEST, Motorola—a $10.9 billion company—is also the largest U.S. semiconductor company and the fourth largest semiconductor manufacturer in the world.

Recently I attended a three-day Motorola Semiconductor press and financial community briefing in Austin. The purpose of the get-together was to discuss Motorola's product and market strategies, give the press and financial types an opportunity to have one-on-one discussions with Moto execs, and dedicate the new $500-plus million MOS-11 manufacturing facility there. Five hundred million smackers. Wow!

The '90s is going to be an exciting decade—2000, here we come! And the Moto folks described just how exciting it is going to be. Not just the expected technology whiz-bangs, or management's focus on the value chain to reduce time to market and improve customer satisfaction. No, there's more to the paradigm. And the more part has to do with managing the softer issues. Listening to the customer. And managing relationships.

Rank	Company	1990 semiconductor sales ($ billions)
1.	NEC	4.5
2.	Toshiba	4.4
3.	Hitachi	3.5
4.	Motorola	3.4
5.	Intel	2.9

Source: Dataquest

On the second day of the meeting Chris Galvin, grandson of the founder of Motorola, talked about the history of the company. Talked about how his grandfather, Paul Galvin, failed twice in business. How he picked himself up and in 1928 started Motorola. Chris talked about the Motorola strategy, the commitment to Six Sigma, and Motorola's entry into the fluorescent lighting ballast business with an electronic ballast that would replace the old magnetic version. What? What's Moto doing in the fluorescent lighting ballast business?

Now, I don't know diddley about fluorescent lights. But I do know Chris Galvin's remarks about how the electronic ballast would change the economics of that marketplace really set me on my ear. Dramatic energy-cost savings, improved performance in light quality, low harmonic distortion, and no flicker. All market-entry advantages. But what hit me most was the use of six sigma quality as a competitive weapon. The Motorola product strategy is to delay introduction until the quality levels are 5.7 sigma or higher. Think about it. Motorola's quality levels would likely be 4,000 times better than the competition, based on my assumption that magnetic ballasts quality levels are in the three-sigma range. It may be a lousy assumption on my part, and my math may be rusty, but you get my point.

I have been in the electronics business 35 years, and this is the first time I have ever heard an American executive talk about using quality as a competitive advantage and then tying numbers to the quality promise. No slogans. No empty, arm-waving quality claims. Numbers. Think about it. The new paradigm suggests one search for major market segments where your technology gets you in the door and your quality changes the rules of the game.

New paradigm indeed.

—Frank Burge, Publisher